TABLE. Awareness of the Parameters Tested During Antibiotic Approval for Presumptive Urinary Tract Infection

Department, job title	Results of urinalysis	Presence of Foley catheter	Results of urine culture
Medicine			
Postgraduate year 1 (n = 21)	12 (57)	4 (19)[a]	19 (90)
Postgraduate year 2 (n = 19)	11 (58)	15 (79)[a]	19 (100)
Postgraduate year 3 (n = 12)	8 (67)	7 (58)	12 (100)
Physician assistant (n = 4)	1 (25)	2 (50)	3 (75)
Nonmedicine			
Postgraduate year 1 (n = 5)	0 (0)	1 (20)	4 (80)
Postgraduate year 2 (n = 4)	2 (50)	2 (50)	3 (75)
Postgraduate year 3 (n = 3)	1 (33)	2 (67)	2 (67)
Physician assistant (n = 3)	0 (0)	0 (0)	3 (100)

NOTE. Data are no. (%) of healthcare personnel who were aware of the parameter.
[a] Z test for proportions, $P < .05$.

graduate year 2 residents in the Department of Medicine paid more attention to the presence of Foley catheters than the postgraduate year 1 personnel. More differences, especially among nonmedicine house staff and physician assistants, might have appeared if we had achieved a higher number of responses from providers in these departments.

Our study has limitations. We evaluated the awareness of healthcare professionals about certain parameters but did not assess their ability to interpret these parameters. Also, the responses provided by healthcare professionals were not confirmed by the investigators. As in most surveys, the data gathered may not truly represent the entire population being studied. For example, it is possible that those house staff physicians who were aware of the difference between colonization and infection did not call for antibiotic approval, so that our antibiotic approval process captured a less informed clientele. Those who did not recognize the significance of interpretation of these tests and who continued to call for subsequent approvals might have had their responses recorded more than once. The survey was voluntary, and therefore we were not able to obtain input from all healthcare professionals. Our data set is small, but it is a useful snapshot of the attitudes and perceptions of clinicians relevant to this topic.

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Investigation of Individuals Exposed to a Healthcare Worker with Cavitary Pulmonary Tuberculosis

TO THE EDITOR—We report a large-scale contact investigation undertaken after a hospital-based nurse developed pulmonary tuberculosis, and we highlight the difficulties involved in managing this investigation. Our study of the in-

vestigation was approved by the institutional review board at Texas Tech University Health Sciences Center.

The index patient was a 56-year-old registered nurse who worked in the outpatient surgery unit of a 365-bed tertiary hospital. She presented to her physician with a cough of 3 months' duration, minimal sputum production, occasional fever, and a 10-lb unintentional weight loss. Radiographic images of her chest revealed bilateral cavitary infiltrates. Acid-fast bacilli were detected in sputum smears; *Mycobacterium tuberculosis* was subsequently isolated from her sputum and identified by genetic probe; the isolates were found to be susceptible to all antimicrobials tested. She completed 9 months of treatment, which resulted in symptom resolution and clearing of the infiltrates from radiographic images. Three years earlier, the patient had had a reactive tuberculin skin test (TST) result and a normal chest radiograph. She was asymptomatic and declined treatment for latent tuberculous infection.

A contact investigation was conducted by the hospital infection control staff, employee health personnel, and the Texas Department of State Health Services. The hospital contacted all healthcare workers (HCWs) who worked in the outpatient surgery unit during the period that the index patient was estimated to be infectious. Letters were mailed to all patients who underwent a procedure in this unit during this time, encouraging them and any visitors present with them during their procedures to be tested for tuberculosis. Finally, general public announcements were made through the local media to inform the public and encourage testing.

It is not known when the index patient was exposed to tuberculosis. Each year since her reactive TST result, she had completed a questionnaire as a part of the hospital's infection control policy on which she indicated that she had no symptoms consistent with active tuberculosis. She worked as a nurse in a 25-bed outpatient surgery unit, preparing patients for surgical procedures. A team-based approach to patient care is used in this unit, which makes an individual HCW's level of patient contact difficult to ascertain. She worked approximately sixty 8-hour shifts in the 3-month period during which she was now thought to have been infectious. There were 2,090 patient visits during this period, with up to 2 visitors per patient.

Three members of the index patient's immediate family had positive TST results. Her husband had a minimally abnormal chest radiograph and negative culture results. Thirty-three workers in outpatient surgery were tested, and 3 (9.1%) who had previously had negative TST results now had positive results. Four hundred sixteen other hospital workers were tested, and 3 (0.7%) who had previously had negative TST results now had positive results. Twelve hundred sixty-one patients were tested; 60 (4.8%) had positive TST results. One thousand twenty-seven indirect contacts (ie, patients' friends and family members) were tested; 32 (3.1%) had positive TST results. Prior TST status was unknown for the majority of patients and indirect contacts. Only 2 potential contacts had abnormal chest radiographs and received active treatment. No contacts had culture results positive for *M. tuberculosis*.

This large-scale contact investigation occurred after an HCW with active tuberculosis had worked in a hospital for approximately 3 months before her illness was diagnosed. The high percentage of positive TST results among her family members and the change in TST status noted for several coworkers provide epidemiologic evidence of her infectivity and disease transmission. However, this HCW probably did not infect many casual contacts, and we suspect that the positive TST results among her contacts represent remote infection unrelated to this exposure. Other studies have reported contact investigations in the healthcare setting and have noted the difficulty of determining the extent of investigation required in such a situation.[1-5] Our hospital follows the 1994 Centers for Disease Control and Prevention guidelines for healthcare facilities, but we were still confronted with a serious situation and uncertainty about the extent of infection and clinical disease.[2] We missed an opportunity for disease prevention when the index patient declined treatment for latent tuberculous infection 3 years prior to her reactivation. Other studies have noted poor adherence to recommended strategies for tuberculosis control among HCWs.[6-9] Education about the signs and symptoms of tuberculosis is an essential component of a hospital infection control program. It can help HCWs identify patients who exhibit signs of the disease, and it may increase adherence to tuberculosis control measures, including prophylaxis, among HCWs. This education may be more important now than it has been in the past, because the incidence of tuberculosis in the United States is presently low.

This experience highlights the following issues: (1) HCWs with communicable illness have the potential to infect many people, (2) the education of HCWs about tuberculosis remains an important aspect of effective infection control programs, and (3) encouraging HCWs with latent tuberculous infection to accept treatment can reduce the occurrence of these unusual situations. Therefore, all institutions should regularly review their policies in this area. In addition, our investigation was complicated by its scale (2,740 contacts were tested) and the prolonged demand it imposed on personnel resources. The organization of patient care in the outpatient surgery unit did not allow risk stratification of casual contacts (ie, patients and friends) according to frequency and length of contact. A more intense initial survey of coworkers would have provided information about infectivity and perhaps resulted in a more orderly approach to casual contact investigation. Specifically, all coworkers should have been evaluated within a week by use of TST, questionnaires, and chest radiography to estimate the infectivity of the index patient. Finally, our hospital did not have any experience with an investigation of this size and had valid concerns about its responsibility with respect to this potential hazard. Our experience suggests that future responses to similar investiga-

tions might involve a "war room" strategy, with weekly meetings of the personnel involved and distribution of updates on the number of contacts tested and their results. In addition, institutions should consider mock exercises in investigation management to become more familiar with these issues.

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Management of Potential Laboratory Exposure to Avian Influenza (H5N1) Virus: Implications for Pandemic Planning

TO THE EDITOR—Since the emergence of the avian influenza (H5N1) virus, the medical community has been preparing for a possible influenza pandemic. The preparedness of our hospital was tested recently when local laboratory workers at the biosecurity level 3/4 Australian Animal Health Laboratory (East Geelong, Victoria) were potentially exposed to birds infected with avian influenza virus as a result of a fault in their personal respirators. There have been no documented cases of avian influenza contracted in the laboratory setting, but as scientists continue to work with this virus, it poses a potential risk.

The laboratory was undertaking research with an Indonesian isolate of the avian influenza (H5N1) virus, and 5 ducks had been experimentally infected with the virus in a physical containment level 3 animal room. Staff wore powered air-purifying respirators (provided by 3M and compliant with Australia/New Zealand Standards[1]) to protect themselves from airborne pathogens, in addition to standard personal protective equipment.

One of the staff members who had been working with the infected birds discovered that the air filter cartridge on her powered air-purifying respirator was not attached. It was ascertained that 2 other staff members had used the same powered air-purifying respirators in the past week while working with the birds, and neither could remember whether the filter had been correctly attached. One of these workers experienced upper respiratory tract symptoms at home. Because the Australian Animal Health Laboratory does not have facilities for human patients, the exposed workers were assessed at our hospital (Barwon Health; Geelong, Victoria), the local tertiary care referral center. The hospital had been involved in a recent multicenter simulation exercise to assess the adequacy of procedures for suspected cases of avian or pandemic influenza[2] and has management protocols for suspected cases of severe acute respiratory syndrome and highly pathogenic influenza.

Assessments of the laboratory workers were performed in the only negative-pressure respiratory isolation room in the busy emergency department. The patients were transported individually to the hospital in private cars and were assessed sequentially. The workers were instructed to enter through the ambulance bays, rather than through triage, to avoid contact with other patients. The importance of communication was highlighted when one worker entered the emergency department unannounced, rather than waiting for our signal, potentially creating an opportunity for viral spread. There were further difficulties with congestion around the ambulance bays, because hospital security did not coordinate traffic.